Claims

Sub A1

1. An apparatus for tracking signals comprising:

a first tracker for tracking a first component of a first signal and for generating a first estimate signal from a second component of the first signal;

a second tracker for tracking a first component of a second signal according to the first estimate signal; and

the second component of the first signal has the same pattern as the first component of the second signal.

2. An apparatus according to claim 1, wherein the pattern comprises:

a known pattern combined with an unknown pattern.

3. An apparatus according to claim 2, wherein timing information about the unknown pattern is known.

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4. An apparatus according to claim 3, wherein:

the first tracker generates a timing signal in accordance with the timing information for improving the accuracy of the first estimate signal.

5. An apparatus according to claim 2, wherein:

the first tracker generates a first local component signal in accordance with the known pattern and combines the local component signal with a version of the first signal to generate the first estimate signal.

6. An apparatus according to claim 2, wherein:

the second tracker generates a second local component signal in accordance with the known pattern and combines the second local component signal with at least one version of the second signal to generate at least one second estimate signal.

7. An apparatus according to claim 6, wherein:

the second tracker generates a timing signal in accordance with the timing information for improving the accuracy of the at least one second estimate signal.

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8. An apparatus according to claim 5, wherein:

the second tracker combines the first estimate signal with the at least one second estimate signal to provide a tracking signal for tracking the first component of the second signal.

9. An apparatus according to claim 8, wherein:

the second tracker combines the first estimate signal with the at least one second estimate signal to generate a combined estimate signal.

10. An apparatus according to claim 9, wherein:

the second tracker combines the first estimate signal with the at least one second estimate signal when the second tracker has not locked to the first component of the second signal; and

the second tracker combines the combined estimate signal with the at least one second estimate signal when the second tracker has locked to the first component of the second signal.

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11. An apparatus according to claim 2, wherein:

the first signal is a GPS L1 signal;

the second signal is a GPS L2 signal;

the first component of the GPS L1 signal is a C/A-code component;

the second component of the GPS L1 signal is a Y-code component;

the first component of the GPS L2 signal is a Y-code component;

the known pattern is a GPS P-code;

the unknown pattern is a GPS W-code;

12. A method for tracking signals comprising the steps of:

locking to a first component of a first signal;

aligning a local version of a second component of the first signal with the first component of the first signal;

aligning a local version of a first component of a second signal with the first component of the first signal;

generating a first estimate signal from a version of the first signal and the local version of the second component;

applying the first estimate signal for locking to a first component of the second signal; and

wherein the second component of the first signal and the first component of the second signal comprise the same pattern.

13. A method for tracking signals comprising the steps of:

locking to a first component of a first signal;

aligning a local version of a second component of the first signal with the first component of the first signal;

aligning a local version of a first component of a second signal with the first component of the first signal;

generating a first estimate signal from a version of the first signal and the local version of the second component;

generating a second estimate signal from a version of the second signal and a local version of the first component of the second signal;

combining the second estimate signal and the first estimate signal to generate a combined estimate signal; and

selectively applying either the first estimate signal or the combined estimate signal for locking to a first component of the second signal; and

wherein the second component of the first signal and the first component of the second signal comprise the same pattern.

14. The method of claim 13, wherein the step of selectively applying further comprises the steps of:

selecting the first estimate signal for application if the local version of the first component of the second component has not been locked; and

selecting the combined estimate signal for application if the local version of the first component of the second component has been locked.

15. A method of semi-codeless tracking for a GPS receiver comprising the steps of:

receiving a GPS L1 signal and generating at least a quadrature baseband version of the GPS L1 signal;

receiving a GPS L2 signal and generating baseband versions of the GPS L2 signal;

multiplying the quadrature baseband version of the GPS L1 signal with a locally generated version of a P-code used to generate the Y-code component of both the GPS L1 and L2 signals to generate a first estimate signal related to the W-code used with the P-code to generate the Y-code component;

multiplying the in-phase baseband version of the GPS L2 signal with a locally generated version of the P-code to generate a second estimate signal related to the W-code used with the P-code to generate the Y-code component;

adding the first W-code estimate signal to the second W-code estimate signal to generate a combined W-code estimate signal;

applying the first W-code estimate signal to generate tracking signals for tracking when the GPS receiver has not locked to the GPS L2 signal; and

applying the second W-code estimate signal to generate tracking signals for tracking when the GPS receiver has locked to the GPS L2 signal.

16. A method of semi-codeless tracking for a GPS receiver comprising the steps of:

receiving a GPS L1 signal and generating at least a quadrature baseband version of the GPS L1 signal;

receiving a GPS L2 signal and generating baseband versions of the GPS L2 signal;

multiplying the quadrature baseband version of the GPS L1 signal with a locally generated version of a P-code used to generate the Y-code component of both the GPS L1 and L2 signals

to generate a first wide-band estimate signal related to the W-code used with the P-code to generate the Y-code component;

integrating the first wide-band estimate signal based on known timing information of the Y-code to generate a first narrow-band W-code estimate signal;

multiplying the in-phase baseband version of the GPS L2 signal with a locally generated version of the P-code to generate a second wide-band estimate signal related to the W-code used with the P-code to generate the Y-code component;

integrating the second wide-band estimate signal based on known timing information of the Y-code to generate a second narrow-band W-code estimate signal;

adding the first narrow-band W-code estimate signal to the second narrow-band W-code estimate signal to generate a combined W-code estimate signal;

applying the first narrow-band W-code estimate signal to generate tracking signals for tracking when the GPS receiver has not locked to the GPS L2 signal; and

applying the second narrow-band W-code estimate signal to generate tracking signals for tracking when the GPS receiver has locked to the GPS L2 signal.

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